

Study on Vitamin D Deficiency in Polycystic Ovary Syndrome Patients in Tertiary Care Hospital

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ABSTRACT

Background: The importance of Vitamin D is unquestionable due to its contribution in the regulation of many physiological processes such as immune system, insulin secretion, cancer, cell differentiation and reproduction through vitamin D receptor (VDR). **Methods:** 98 PCOD cases were included in this study. This study was conducted in the Department of Biochemistry & Pharmacology in the Patna Medical College, Patna, Bihar. The duration of study was over a period of one year. **Results:** In the present study, 85.7% cases had vitamin D deficiency, 10.2% cases had insufficiency and 4.1 normal cases. Amongst all cases, 53.1% cases were obese and 46.9% cases were lean. **Conclusion:** The study suggested that revealed that Vitamin D deficiency is common in patients of PCOS, both in lean and obese. It was also observed that supplementation with Vitamin D and Calcium can improve the menstrual disorders associated with PCOS and with a favorable reproductive outcome.

Keywords: PCOD, Vitamin D, Lean, Obese

INTRODUCTION

Polycystic ovary syndrome (PCOS) is the most common female endocrine disorder.^[1] It affects approximately 4%–18% reproductive age group women.^[2–5] It is a heterogeneous androgen excess disorder with different degrees of reproductive and metabolic dysfunctions. Insulin resistance, hyperinsulinemia and dyslipidemia, are some common features in the women with PCOS.^[6–12] PCOS may also lead to elevated risk of vitamin D deficiency (VDD). It has been observed that approximately 67%–85% women with PCOS have VDD.^[13–16]

Now days, the importance of Vitamin D is unquestionable due to its contribution in the regulation of many physiological processes such as immune system, insulin secretion, cancer, cell differentiation and reproduction through vitamin D receptor (VDR).^[17]

There are many causes of vitamin D deficiency like reduced skin synthesis, absorption of vitamin D, acquired and heritable disorders of vitamin D metabolism. Use of sunscreen, presence of pigment

in the skin, patients with skin grafts for burns will also cause a reduction in the synthesis of vitamin D. Due to liver failure and kidney disease, metabolism of vitamin D can also be affected.^[18] Insulin resistance and compensatory hyperinsulinemia are the two-underlying pathogenesis of PCOS.^[19] Increased insulin resistance causes an increase in weight that activates hyperandrogenism and, thus, results in clinical symptoms. Though insulin resistance more frequently appears in obese patients (65%) in comparison to lean patients with PCOS (20%).^[20]

The objectives of the present study are to detect hypovitaminosis D and metabolic syndrome in patients of Polycystic Ovarian Syndrome and to detect favorable reproductive outcome in terms of ovulatory cycles and menstrual cycle regularity after supplementation with vitamin D.

MATERIALS AND METHODS

Study Population:

98 PCOD cases were included in this study.

Study Area:

This study was conducted in the Department of Biochemistry, Obs. & Gynae & Pharmacology in the Patna Medical College, Patna, Bihar.

Study Duration:

The duration of study was over a period of one year.

Data collection:

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98 patients of PCOS were included in the study, comprised the information regarding age, height, weight, BMI and waist circumference. It also included information regarding menstrual symptoms like menstrual cycle regularity, oligomenorrhea, high menstrual bleeding, amenorrhea, blood pressure measurement, markers of metabolic syndrome and presence of insulin resistance, past history and family history. The parameters like vitamin D level, fasting blood sugar level, fasting insulin level and lipid profile done in biochemistry department. All patients showing vitamin D levels (25(OH)D) concentrations ≤ 30 ng/mL (<75 nmol/L) was noted as low Vitamin D levels. These patients were supplemented with 60000 IU of vitamin D3 once a week for 8 weeks and 500 mg of supplemented calcium was given every day. The patient was assessed every month over a period of six months. Favorable reproductive outcome in terms of menstrual cycle regularity, ovulatory cycles, and pregnancy was noted.

Data Analysis:

Data were analyzed by using Statistic & Microsoft excel.

RESULTS

In our study, 98 total numbers of cases were included. Among the all cases 57.1 % cases were belongs to 21-25 age group followed by other age group. In the present study, 85.7% cases had vitamin D deficiency, 10.2% cases had insufficiency and 4.1 normal cases. Amongst all cases, 53.1% cases were obese and 46.9% cases were lean. We were received different outcomes & parameters which showed in [Table 5].

Table 1: Distribution of Cases According to Age

Age group	No of cases	Percentages
16-20	20	20.4%
21-25	56	57.1%
26-30	11	11.3%
31-35	2	2.1%
36-40	9	9.1%
Total	98	100%

Table 2: Distribution of Cases According to Vitamin D Status

Vitamin D	No of Cases	Percentages
Deficiency	84	85.7%
Insufficiency	10	10.2%
Normal	4	4.1%
Total	98	100%

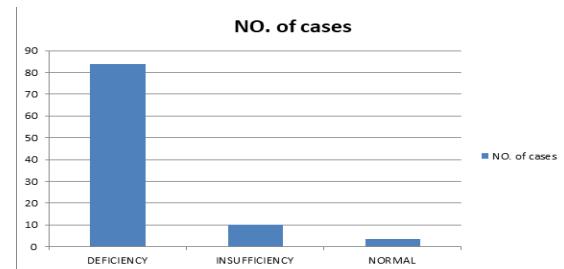


Figure 1: This Graph Showed Distribution of Cases According to Vitamin D Status

Table 3: Distribution of Cases According to Obese/Lean

Type	No Of Cases	Percentages
Obese	52	53.1%
Lean	46	46.9%
Total	98	100%



Figure 2: This Graph Showed Distribution of Cases According to Obese/Lean

Table 4: Distribution of Cases According to Outcome

Outcome	No Of Cases	Percentages
Cycles Regularised	46	46.9%
Conceived	20	20.5%
Lost To Followup	8	8.1%
Still On Treatment	24	24.5%
Total	98	100%

Table 5: Distribution Of Cases According To Parameters

Parameters	No. Of Cases	Minimum	Maximum	Mean
BMI(kg/m ²) (18.5-24.9)	98	20.00	36.80	26.54
WAIST CIRCUMFERENCE (cm)<80cm	98	68.00	100.00	83.05
FASTING INSULIN (2.6-24.9 μ U/mL)	98	2.00	41.44	14.84
VITAMIN D LEVEL (30-100ng/mL)	98	4.2	31.49	13.34
FASTING BSL(70-100mg/dL)	98	72.00	112.00	87.69
SERUM CHOLESTROL(125-200 mg/dL)	98	154.00	252.00	178.7
HDL(35-80mg/dL)	98	34.00	50.00	41.8
LDL (85-130mg/dL)	98	83.40	133.00	96.6
TRIGLYCERIDES(25-200mg/dL)	98	97.00	140.00	111.3

DISCUSSION

Vitamin D not only plays a role in bone metabolism, but also has important functions in the reproductive system. Its receptors are found in ovarian and endometrial tissues. It also plays an important role in steroidogenesis. Vitamin D deficiency has been reported in all age groups in all over India. This is possibly due to the poor sun exposure, dark skin complexion, atmospheric pollution, vegetarian food habits, absence of food fortification with vitamin D, and poor intake of vitamin D supplements. Garg et al (2015) conducted a study and found Vitamin D deficiency in 93.8% in all PCOS patients while the rest had vitamin D insufficiency (20-30 ng/mL).^[21,22] In this study, out of 98 PCOS cases, vitamin D deficiency was found in 85.7% cases, insufficiency was found in 10.2% cases and only 4.1% cases had normal vitamin D levels. The mean value of vitamin D was 12.9 (4.2- 31.4). Setenay Arzu Yilmaz, found in one of his study the mean Vitamin D level of the lean PCOS cases was 12.4 (4.1- 46.7) ng/mL and mean Vitamin D level of the obese PCOS cases was 10.1 (2.5-25.0) ng/mL.^[23] In PCOS patients, vitamin D levels were found to be low, independent of BMI and insulin resistance.^[24] Mazloomi S et al reported low levels of vitamin D in women with PCOS, with average vitamin D (25-OHD) levels between 11-31 ng/mL, and the majority having values <20 ng/mL (67-85%). These results are comparable to our study. Besides other risk factors, PCOS itself was found to be associated with decreased vitamin D levels. These findings are very much similar to our study findings.

In the present study, out of 98 cases of PCOS, 46 cases were lean and 52 belonged to obese. Mean age of 98 cases was 23.4±3.9 years. Age ranged from 16 years to 40 years. In this study, out of 46 lean PCOS, 78.2% had Vitamin D deficiency [< 20 ng/mL] and 17.3% had Vitamin D Insufficiency [20-30 ng/mL] whereas out of 52 obese PCOS 92.3% had Vitamin D deficiency and 3.8% had Vitamin D Insufficiency. Several studies have reported contrary associations between body weight and serum 25-OHD levels in women with PCOS. 27-56% lowers in obese women with PCOS compared to non-obese women with PCOS. A recent study in women with PCOS also observed low 25-OHD levels were significantly determined by the degree of adiposity (BMI and total fatmass) and were not directly affected by the development of insulin resistance.^[25] This study also revealed that out of 98 PCOS patients, 6 (6.1%) patients had markers of metabolic syndrome in the form of raised cholesterol, triglycerides, LDL, reduced HDL, hypertension, central obesity, raised fasting blood sugar levels in one or more combinations. Kotsa et al found an improvement of HDL and triglycerides after treatment with vitamin D in a small cohort of PCOS women.^[26,27] Low HDL

and elevated triglycerides are central features of metabolic syndrome. In this study of 98 PCOS patients, 46.9% patients had markers of insulin resistance like acne, hirsutism, acanthosis nigricans. In vitamin D deficiency patients, 6 Lakh IU given intramuscularly, 2 doses 6 weeks apart, and in those with insufficiency oral vitamin D supplementation was given in the form of 60,000 IU, once a week for 8 weeks and thereafter once a month as maintenance. Besides this, oral calcium 500 mg tablets were also added once daily. In the patients with insulin resistance and obesity, metformin 500 mg tablet was given in oral form. Additionally, advice on diet and lifestyle modification was also given. Other insulin sensitizers like myo-inositol, D-chiro inositol, and berberine were not given in any of these patients.

Out of 49 cases of PCOS, 47 patients (95.9%) received exclusively vitamin D supplementation and calcium supplementation. Results of this study also found that 91.8% patients who came for follow up, 20.4% patients conceived and 46.9% patients had regular menstrual cycles after treatment. This is a significant observation. Our study findings are supported by Thys-Jacobs S et al study.

CONCLUSION

The study concludes that revealed that Vitamin D deficiency is common in patients of PCOS, both in lean and obese. It was also observed that supplementation with Vitamin D and Calcium can improve the menstrual disorders associated with PCOS and with a favorable reproductive outcome. Though, the present study has its limitation in the small sample size. Studies with large number of patients will confirm the potential benefits of Vitamin D supplementation in PCOS patients. Further investigations are required to explore the relationship between vitamin D and PCOS.

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